Federal Aviation Administration
National Aeronautical Navigation Products

PERFORMANCE WORK STATEMENT (PWS)
d-TPP GeoReferencing and PDF Conversion

1. INTRODUCTION

The Federal Aviation Administration (FAA), National Aeronautical Navigation Products (AeroNav Products) provides digital and paper aeronautical navigation products for civil and military customers. Among these products is the Terminal Procedures Publication (TPP) in both digital PDF format enhanced by XML metadata as well as a 26 volume printed paper book set. The PDF charts contained within the digital TPP currently have no geo-referencing information embedded within the files. The FAA has a requirement to replace its current system to convert MicroStation design files to PDFs.   The system must enforce critical workflow options and enhance the PDF output to include geo-referencing information.

2. DEFINITIONS AND ACRONYMS

AeroNav Products – National Aeronautical Navigation Products
APD – Airport Diagram
COTR – Contracting Officer's Technical Representative
CVFP – Charted Visual Flight Procedure
DP – Departure Procedure
d-TPP – digital Terminal Procedures Publication
DVD – Digital Versatile Disk
FAA -- Federal Aviation Administration
FURPS – Functional, Usability, Reliability, Performance, Security
IAP – Instrument Approach Procedure
JAD – Joint Applications Development Team
ODBC – Open Database Connectivity
PDF – Adobe Portable Data Format
PWS – Performance Work Statement
TPP – Terminal Procedures Publication
SRS – Supplemental Requirements Specification
STAR – Standard Terminal Arrival
V8i – Version 8 of Bentley's Microstation CAD software

3. SCOPE OF WORK

The FAA currently uses a software to convert Microstation J (version 7) design file format charts into PDF format for publication in the Terminal Procedures Publication (TPP) product. The PDF output from this software serves as input to the printing process to produce the 26 volume TPP printed books as well as serving as input to the

digital version of the TPP, the d-TPP. The software that produces these PDFs has many processing options that the FAA uses to control production and assure quality. The contractor shall replace the current FAA conversion software supporting the latest version of Microstation (version V8i) and shall fulfill all the processing options contained within this PWS.

The contractor shall lead a Joint Application Development (JAD) to create a set of requirements specifications to be used by the contractor in the development of a d-TPP PDF system. The contractor will manage and perform the tasks as defined within this PWS.

Project Management deliverables include a Project Management Plan, Work Breakdown Schedule (WBS), and Project Schedule. The government will review these documents before any development work will be authorized.

The contractor shall be responsible for the requirements analysis, system design, implementation, testing, and transition resulting in a production form of a software that will convert Microstation V8i design files into PDF format that include geo-referencing information. The resulting PDF files will be used for situational awareness within GPS displays. The production software must satisfy various batch processing and shared properties controls detailed within the functional requirements.

After the development and testing of the Design File to Georeferenced PDF software, the contractor shall implement a mass conversion and quality check of the FAA chart repository into georeferenced PDF files. This output will serve as the final PDF product in support of both the digital and printed Terminal Procedures Publication (TPP) product.

4. TASKS

4.1. Task 1: Project Management

4.1.1. Task 1, Subtask 1: Hold Kick-Off Meeting

Within 15 days of contract award, the contractor shall hold a kick-off meeting at the FAA facility in Silver Spring MD. The purpose of this meeting and follow-on discussions, if needed, will be to define the following:
1. Initial objectives, project milestones, and priorities
2. Organizational structure
3. Rules and processes for decision-making
4. Participants and their roles
5. Agree on structure for the JAD
    a. Frequency of JADs
    b. Number of JADs
    c. Ground Rules

4.1.2. Task 1, Subtask 2: Prepare Project Plan

The contractor shall develop and deliver a project management plan, work breakdown structure, and associated schedule per dates specified in the deliverables section below. The schedule must depict a planned project baseline that will be used as a reporting reference as project work proceeds. The project schedule should identify milestones and deliverables. The contractor will meet with the FAA Technical Representative to discuss the tasks, goals and schedule of the project. Based upon these discussions, the contractor shall prepare a draft project plan and submit it for approval. After the approval, the project plan and schedule will be accepted and will serve as the projected baseline. Upon acceptance, the project will be tracked by this baseline.

4.1.3. Task 1, Subtask 3: Progress Reporting

The contractor shall submit monthly status reports to the Contracting Officer (CO) and the Contracting Officer's Technical Representatives (COTR) to include, at a minimum,

1. progress during the reporting period
2. cost and schedule metrics that report whether the project is ahead or behind projected baseline
3. action item status
4. difficulties or delays
5. action taken to overcome reported problems
6. any assistance required by the US government
7. a description of the work planned for the upcoming reporting period

These reports may be submitted electronically. The report is due no later than five days after the close of the calendar month.

4.1.4. Task 1, Subtask 4: Critical Design Review

The contractor shall participate in a critical systems design review with FAA JAD members to present the requirements gathered during the JAD sessions. The software architecture shall also be reviewed. The contractor shall obtain sign-off that the system meets the FAA requirements and is compatible with FAA IT constraints and environment. The artifacts reviewed will be the Use-Case model, the Supplementary Requirement Specification, and the Software Architecture document. Advance copy of the deliverables should be made available for JAD members to review sufficiently prior to the expected sign-off to allow thorough review. A reasonable number of follow-on correspondence or meetings under approval of the government are permissible as needed to finalize deliverable sign-off. The critical design review shall take place after all requirement are gathered, system design is complete, and before construction of a software solution begins.

4.2. Task 2: System Requirements

4.2.1. Task 2, Subtask 1: Facilitate JAD Meetings

The contractor shall lead a Joint Applications Development team (JAD) to deliver the documentation and subsequent reports for the requirements gathering of the software. The team will be made up of FAA subject matter experts (SMEs) and FAA project support staff as well as a contractor facilitator, and requirements experts needed to conduct the meeting. The contractor shall be responsible for providing agendas, facilitating and mediating the meetings, taking notes, and distributing the meeting minutes following each meeting. Information gained from the JAD meetings shall serve as the primary input for creating the requirements package deliverables defined below. Given the complexity of the requirements, a maximum of two (2) JAD meetings are deemed necessary to gather all the requirements.

4.2.2.   Task 2, Subtask 2: Create System Requirements Artifacts

According to input received in the JAD team meetings the contractor must deliver a Use Case Specification detailing each of the user interactions that are needed to produce all the system requirements. The contactor must also produce a Supplemental Requirements Specification (SRS) to list functional, usability, reliability, performance, and security (FURPS) requirements.

4.3. Task 3: Software Development

4.3.1.   Task 3, Subtask 1: System Design & Implementation

The contractor shall design and implement software capable of fulfilling the requirements gathered in Task 2. System design shall be depicted in an informal architectural document including a use-case view, logical view, deployment view, implementation view, and a data view. The informal architecture document shall also include all supported versions of reused software modules, supported operating systems, application server (if applicable), database engine, or any other environmental software. The contractor is free to choose any system design compliant with system requirements and ATO-IT Architectural and System Constraints   The contractor should proceed through coding as part of this subtask.

4.3.2.   Task 3, Subtask 3: System Testing

The contractor shall develop a test plan based on Use Cases and Supplemental Requirements. The contractor shall rigorously test according to the test plan and present testing assessment report that details each iteration of tests, use cases passed and failed during the iteration, and actions taken to bring all use cases into compliance with expected requirements. Factory testing should be considered complete only after government review and acceptance of the test plan and testing assessment report.

4.4. Task 4: Data Delivery

4.4.1.   Task 4, Subtask 1: Mass Conversion of Geo-Referenced Charts

Once the software is developed and all the functional requirements are implemented, the contractor shall take delivery of all the Microstation design files and associated geospatial metadata in the cartographic data repository of the FAA and perform a mass conversion of these files into georeferenced PDF format. This mass conversion must be timed to coincide with FAA production schedules so as to be ready for publication as of the most current publication cycle. Although it is required by the software to be capable of design file to PDF conversion for non-geo-registered charts, these charts, as depicted in the table in section 5.1.2, will not be included in the mass conversion.

4.4.2. Task 4, Subtask 2: Quality Check

As part of the delivery of the mass converted georeferenced PDFs, the contractor must quality check the PDF repository. Quality must be maintained in two different areas:

1. Geo-Registration – The mass converted output PDFs must be tested and variances reported for the positional accuracy of known points plotted on the PDF output as compared to the spatial readout of the embedded georeferenced information that was added to the PDF file by the conversion software.

2. PDF Display – The mass converted output PDFs must conform to the accepted FAA Terminal Procedures Publication (TPP) PDFs on a chart by chart basis. Individual converted PDFs must match published TPP charts in terms of line weights of the entire drawing, colors of gray scale and contour areas, font styles, the inclusion of reference files, overlay screening opacity, and the general inclusion or exclusion of map features, informational text, and neatlines or other boxes. In addition to PDFs representing charts, the textual pages (continuation pages, front matter, etc.) must also pass the same scrutiny.

The contractor must maintain a defects log for discrepancies found in PDFs created by the software. The charts where defects are found, the cause of the problem, and the actions taken to correct the problem must be included in the report for each defect found.

Although non-geo-referenced charts are not to be converted though the mass conversion process, the quality check process should include spot checks of DP, STAR, Charted Visual Flight Procedures, and textual pages that are not georeferenced in order to demonstrate the functionality for these charts.

In the case of geo-registration tests, the contractor must coordinate with the FAA to obtain the feature information with known points that falls on each chart being quality checked for geo-registration. The tolerance for acceptability of the variance of the geo-referenced read out to the known positions of chart features must be obtained by the contractor through discussions with FAA personnel.

In addition to the design file to PDF conversion, the PDF to PDF processing must pass scrutiny for output PDF sizing and text placement.

In the case of PDF Display verification, the contractor shall verify the appearance of the output PDF files through side by side verification of the corresponding existing published TPP PDFs available on the latest cycle of the d-TPP DVD product from the FAA. The contractor must assure that the latest published copy of the d-TPP is used for side by side quality check.

The quality check process implies a defect discovery and repair loop to correct the software and release a new version with the latest correction. This loop must continue during government acceptance testing as well.

4.5. Task 5: Documentation

4.5.1. Task 5, Subtask 1: Programmer Documentation

Along with the delivery of the source code for the new software, the contractor shall provide documentation suitable for qualified, new, unfamiliar programmers to take up a maintenance task for the software. The documentation shall detail low level design of the code and provide detail on all software modules including module interface parameters, general description of methods, and any reused libraries incorporated into the code. Reused libraries shall include version number. Software module (or class) interactions shall be detailed to depict the sequence of software messages passed between classes in the realization of each use-case.

4.5.2. Task 5, Subtask 2: User Manual

The contractor shall provide a user manual detailing every function built into the software interface along with each functions options.

4.5.3. Task 5, Subtask 3: Training Materials

The contractor shall provide training materials to allow Terminal Production Controller to train charting specialist in the use of the software. Also provided shall be the more detailed production controller training. The training materials shall be in the form of Power Point slides along with detail narrative explanation of each slide.

5. FUNCTIONAL REQUIREMENTS

5.1. Inputs

5.1.1. Textual Pages

In addition to georegistered and non-georegistered maps serving as input to the new design file to PDF conversion software, there are textual pages maintained by

the FAA in design file format that need to be included as input to the converter software. These pages are not georegistered. These pages must be accommodated in the design file to PDF conversion process as well as the PDF to PDF processing (detailed in section 5.4.3). For the PDF to PDF processing, the input PDF may be a multi-page PDF for which every page must contain the prescribed text identifiers affixed as well as have the proper sizing.

5.1.2. TPP Aeronautical Navigation Charts

1. Chart Types

   The Microstation design files in the input file repository are Terminal Procedures Publication (TPP) aeronautical navigation charts. The types of charts in the repository are included in the following table. The software developed by this contract must determine the type of chart being processed and, according to the table below, must georeference the charts indicated. For charts that have no georeferencing metadata, the software must accomplish the conversion of the input design file format into PDF but must exclude the georeferencing information.

Table 1: Chart Types

Type of Chart	Geo-Referenced	NOT Geo-Referenced	Approx. Number of Charts in Repository
Instrument Approach Procedures (IAPs)	X		12,000
Charted Visual Flight Procedures (CVFP)		X	63
Airport Diagrams (APD)	X		700
Departure Procedures (DP)		X	1400
Standard Terminal Arrivals (STAR)		X	500
Military Charts (IAPs, DPs, STARs, APDs)		X	1400

2. Geo-Registration

Geo-registration of the input design file charts is applicable to the display within the portion of the chart called the plan view. The plan view is bordered by a rectangular neatline that may be interrupted by one or more overlapping rectangles. Generally, the whole plan view is georegistered with the exception of charts containing an Enroute Facilities dashed circle.
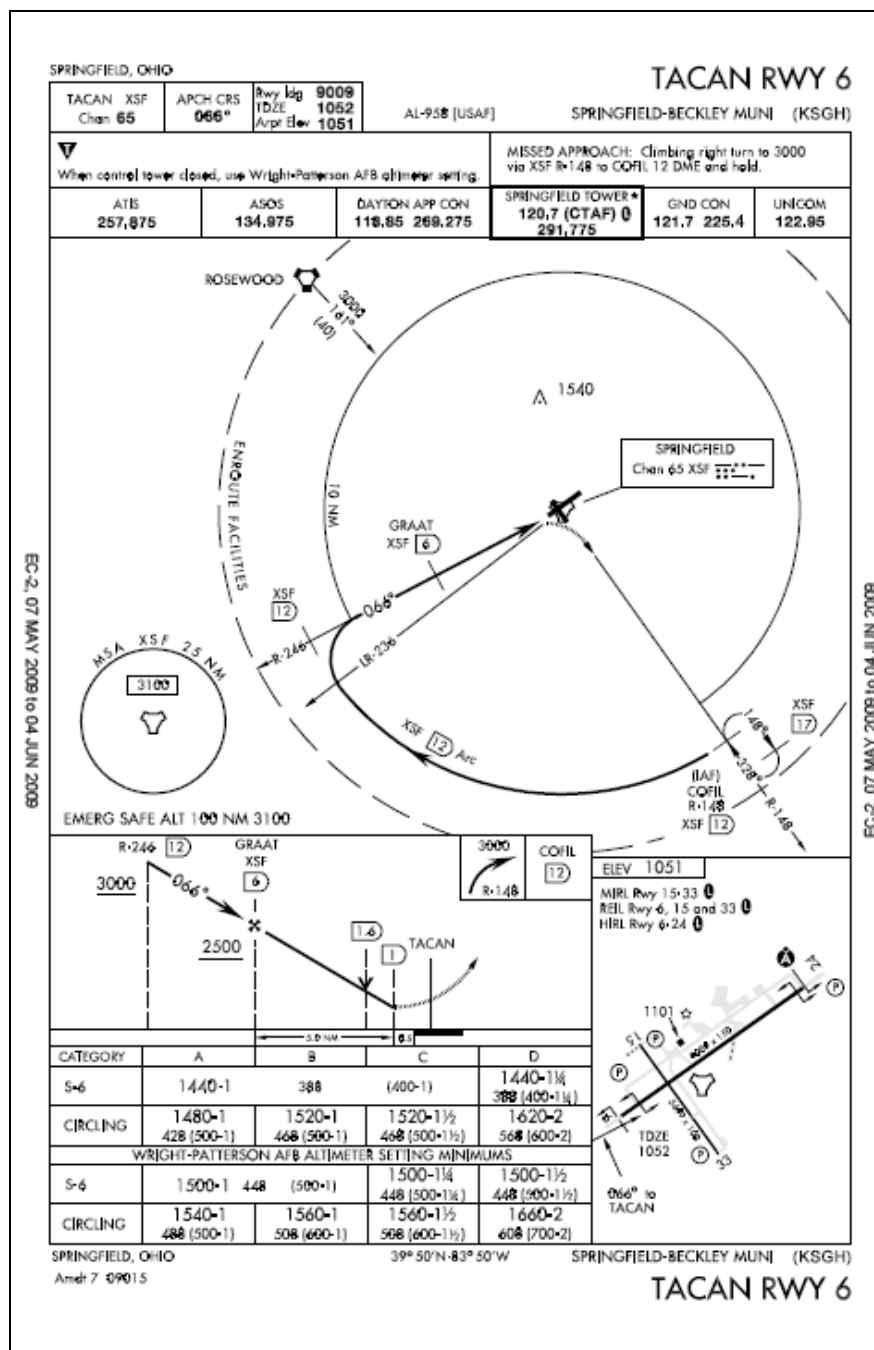
Figure 1: Instrument Approach Procedure Chart (not to scale outside the 10nm feeder circle due to ENROUTE FACILITES dashed circle; display situated "north up.")

For these charts only the display within the associated 10nm or 15nm circles will actually be accurately georegistered. Also features on lines interrupted by a scale break indicator, missed approach boxes, alternate missed approach boxes, terminal augmentation areas, and minimum sector altitude circles are also not drawn to scale.

Figure 2: Instrument Approach Procedure Chart (all the plan view is to scale with the exception of the navaids outside the 3 scale break indicators; display situated "north up.")

5.1.3. Microstation V8i Input Files

The input files that are to serve as input to the conversion process are Microstation V8i design files. The repository of files is made up of approximately 15,000 master design files with one to two reference files used per master design file. The reference files are reused by multiple master design files. Up to 40 or more master design files may use the same reference file. The design

file maps do not use any of the built-in georeferencing support provided in the Microstation V8i design file format. The plotter inches coordinate system of the files is associated to geographic position through external metadata.

5.1.4. Associated Properties Files

1. Graphical

The Microstation V8i input files have ancillary graphical properties files that define:

- plotter line weights,
- font specifications, and
- plotter colors.

These ancillary files will be provided to the contractor. The contractor must replicate the properties portrayed in these properties files not only true to the specifications listed in the properties files, but the contractor must also assure the results through inspection of the output PDFs as compared to the existing PDFs currently produced by the FAA.

2. Job Control

In addition to the graphical properties files, the contractor created process must also possess the capability to define job control parameters that can be reused across as many as 150 users' desktops; as many as 150 desktop installations of the software must use the *same* job control properties file(s). The properties governed through these job control files are as follows:

- Design file construction levels from input files must be forced to display in the output PDF whether the level is turned on or off in the input design file
- Design file construction levels from input files must be forced to NOT display in the output PDF whether the level is turned on or off in the input design file
- Capability 1 & 2 from above must be definable for the master design file and for the included reference file(s) independently: the master file must be able to have a different set of levels forced on or off than the included reference file(s).
- The input design file drawing plane must be able to be centered and cropped in accordance with the extents of the drawing on level 1 of the input design file. The resultant PDF must be centered and cropped by configurable properties in the shared job control files.
- The sizing of the output PDF file, adding or cropping white space from the output PDF to an exact size to enforce output size uniformity. The file size dimensions must be configurable through

the shared properties file(s). This function applies to the PDF to PDF conversion process only (see 5.4.3)

- The job control files must enable input filename wild card filters. Wild card filters must be able to segregate files from an input folder such that separate job control properties can be applied to the independent sets of files.

- Batch processing must be able to use multiple input directories and be able to split output into multiple output directories as specified in the shared job control properties files.

- Job control properties must enable the addition of custom text to output PDF files. The text to be placed, the X,Y coordinate for placement, and the rotation of the text on the output PDF must be configurable through the shared properties file(s) with different text specified for different volumes. As seen in the included sample charts (Figures 1, 2, & 3), this custom text appears in the right and left margins of the charts. The content is the effective date range and the volume identifier of the book the chart appears in.

5.1.5. Associated Georeferencing Metadata

Georegistration of the input Microstation V8i design files is accomplished through associating the design file plotter inches coordinate system to geographic latitude and longitude by use of an ancillary database table. All the design file maps are in Lambert Conformal Conic projection. The database table contains one record per design file. Each record lists a geographic latitude and longitude that is associated with the origin of the design file. Also included is the map scale, top standard parallel, bottom standard parallel, and central meridian of each design file's map projection (see Table 2)

Table 2: Georeferencing Metadata Table

FILENAME	SCL	TSP	BSP	CM	ORGLAT	ORGLON
00010AD.APD	19372	N4244532	N3300000	W07348107	N4244532	W07348107
00010IL19.VLP	500000	N4500000	N3300000	W07348279	N4249024	W07348279
00010IL1.VLP	500000	N4500000	N3300000	W07348040	N4237483	W07348040
00010G28.VLP	500000	N4500000	N3300000	W07340362	N4245081	W07340362
00010COPTERILD1.VLP	500000	N4500000	N3300000	W07347579	N4237342	W07347579
00010G10.VLP	500000	N4500000	N3300000	W07355305	N4244472	W07355305
00010V28.VLP	500000	N4500000	N3300000	W07340075	N4245399	W07340075
00010R1.VLP	500000	N4500000	N3300000	W07347492	N4234139	W07347492
00010R19.VLP	500000	N4500000	N3300000	W07348333	N4251068	W07348333
00443VDG19.VLP	500000	N4500000	N3300000	W07702111	N3851340	W07702111
00443RL19.VLP	500000	N4500000	N3300000	W07709504	N3858119	W07709504
00443V1.VLP	500000	N4500000	N3300000	W07701359	N3845578	W07701359
00443VDG15.VLP	500000	N4500000	N3300000	W07707271	N3855468	W07707271
00443AD.APD	13570	N4500000	N3300000	W07702158	N3851075	W07702158
00443I1.VLP	500000	N4500000	N3300000	W07701359	N3845578	W07701359
00443I1C2.VLP	500000	N4500000	N3300000	W07701359	N3845578	W07701359

Each design file map, with the possible exception of Airport Diagrams, is situated "north up" with the x, y plotter inches grid aligned with latitude and longitude lines (no rotation). Airport Diagrams are projected the same as the north up Instrument Approach Procedure maps although the display may be rotated. Airport Diagram rotation can be defined within the design file graphic by adding additional registration points to the design file and cross-referencing those points to ancillary database table. The ancillary table can draw association from the points placed in the design file drawing plane to geographic coordinates. For 'north up' IAP charts, however, phantom registration points can be interpolated if needed.
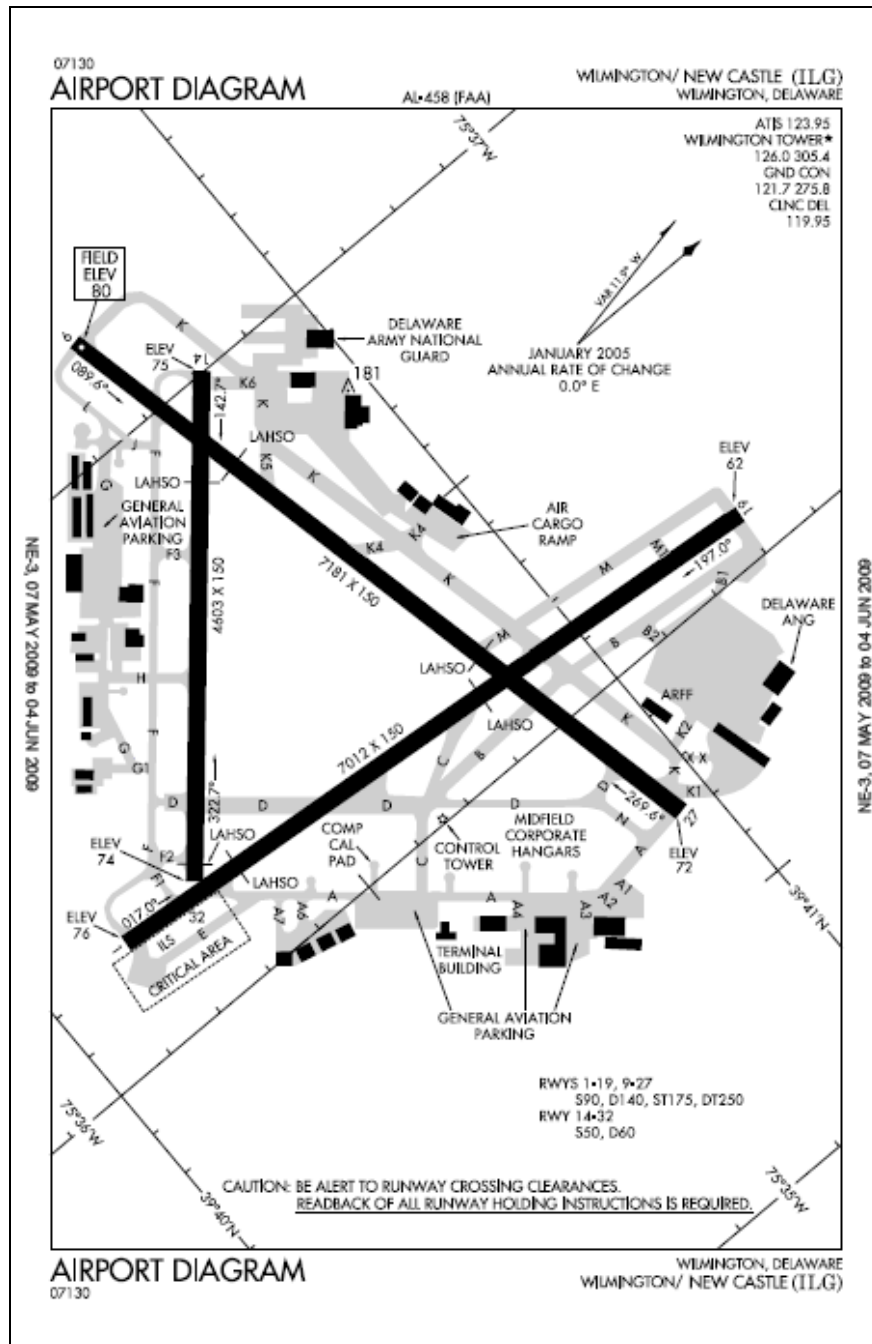
Figure 3: Airport Diagram (plan view is the whole chart inside the neatline: all georegistered and not "north up")

The georegistration of the resultant PDF output may be verified through the inspection of the positions of known aeronautical features that are placed on the PDF map display. The comparison of these points to the geospatial readout should yield accuracy within a defined tolerance to support situational awareness. Aeronautical fixes, navaids, runway ends, and in the case of Airport Diagrams, projection grid intersections are plotted on the maps and have known values that can be compared against the geospatial readout. Accuracy tolerances will be

determined by the government with the contractor input based on the quality of the resultant georeferenced PDFs.

The georeferencing metadata table is maintained by FAA in an enterprise Oracle database. This table must be accessed by the software through a desktop connection to the online production database that maintains this table: preferably through ODBC or other Oracle supported method.

5.2. Outputs

The PDFs output from the contractor's new software must produce PDF output that conforms to the following:

- Georeferencing of the PDF files must be accomplished through embedded information contained in the PDF. No ancillary information or files must be necessary.

- Output file size for the GeoSpatial PDFs must not exceed 5% larger than the existing non-georeferenced PDFs that make up the current d-TPP repository.

- The output PDFs must be printable by the FAA's printing contractor. The paper printed display must pass quality check as defined in section 4.4.2 Quality Check #2 PDF Display from above. The files must especially be of the proper sizing applied in the PDF to PDF processing to enforce uniformity in the printing process.

- The output PDFs must display without anomaly in the FAA's d-TPP Flight application. The d-TPP Flight display must pass quality check as defined in section 4.4.2 Quality Check #2 PDF Display from above. The interactive rendering and display function of the software must process the georeferenced PDFs without error.

- The output PDF files must conform to the strict file naming convention of the master design file input file name. The file names of the input and output must, in fact, match exactly up to the file name extension. Example:

    - Input = 00443VDG19.VLP; then Output will be = 00443VDG19.PDF

    - Input = 00443AD.APD; then Output will be = 00443AD.PDF

5.3. Performance

Processing performance of the software must adhere to the following:

- 3.6 seconds average conversion time per file of an average Microstation V8i design file into a georeferenced output PDF

- 1.2 seconds average processing time per file for PDF to PDF process including the affixing of two text identifiers and the sizing of the output file.

5.4. Production Process Requirements

The software for converting Microstation V8i design files to PDF format must work for the FAA within a strictly defined production process.

5.4.1. Update Schedule

The Microstation V8i Design File repository consists of approximately 15000 maps. As a start up task (defined above section 4.4.1), all of these design file format files are to be converted to PDF in a batch process creating a base repository. Following the initial mass conversion every 56 days 2000 to 3000 design files will be modified and will need conversion from the design file format into georeferenced PDF and be merged back into the PDF repository in order keep the PDF repository up to date with the latest changes. In addition to the 56 day cycle (which is a full volume set publication cycle) there is a change notice cycle process done half way between the 56 day cycle at 28 days. During the change notice cycle approximately 100 to 200 charts are changed and undergo the conversion to georeferenced PDF format. On both the full cycle and the change notice cycle, a PDF to PDF conversion will be done on the entire set of 15,000 files.

5.4.2. Software Configuration

There are two software configurations needed to support TPP chart production and PDF publication: production controller use, and charting specialist use.

- Production Controller Use – The production controller usage of the software is primarily a batch conversion of many design file maps into PDF format at once. This process requires that all the controlling parameters used in the charting specialist use mode are applied to each file to assure uniformity of processing. The batch processes must take input from many input folders and be able to output to one or many output folders within the same batch run. These input and output folders will be network shared folders.

- Charting Specialist Use – Charting specialist use mode will be the processing of 1 to 50 files at a time. As many as 150 charting specialists (i.e. 150 concurrent users) will use the software from their desktop computers. This configuration must be governed by shared parameter files in order to enforce uniformity of process across all users working from different locations. Processing generally is from one input folder to one (perhaps network shared) output folder.

5.4.3. Special Capabilities

There are two distinct process flow capabilities that must be accommodated by the software:

- PDF to PDF – In addition to performing the conversion of design files to PDF format, the software must also support the ability to enhance an existing PDF with additional properties. This configuration implies taking a PDF file as input and applying additional features to the file to produce an enhanced output PDF format file. The first property required is the sizing of the output PDF file, adding or cropping white space from the output PDF to an exact size to enforce output size uniformity. The second property is the addition of text identifiers that define effective date range and TPP volume of the file that is placed by X,Y position, rotation onto the output PDF, and the actual text to be placed. This configuration must work for both georeferenced input PDFs as well as non-georeferenced input PDFs.

- Geo-Referenced / NON-Geo-Referenced – During the conversion of input design files to PDF format, the software must be capable of producing PDFs with georeferencing information embedded in the file but must also be capable of producing PDFs without georeferencing information where indicated (see Table 1 in section 5.1.2 above). The resultant non-georeferenced PDF output must be accomplished by the same software that produces georeferenced PDFs and must adhere to the same PDF Display specifications as indicated in section 4.4.2 #2 above. The georeferenced / non-georeferenced versions must be accommodated in the Design File to PDF configuration as well as the PDF to PDF configuration.

5.4.4. Filtering Requirements

The software's primary function is to translate Microstation design files into georeferenced PDF format. In order for the software being developed to be fully functional and suitable for FAA use in producing the Terminal Procedures Publication, however, there are specific processing functions needed to assure quality control: the software must also serve the filtering and processing functions listed below. The interface currently used by FAA for the PDF processing has many options. There is a subset of these options that are currently in use and are essential to the workflow and processing of the Terminal Procedure Publication (TPP). These options are made up of base functionality used alone and also combinations of base functionality that make up unique capabilities. The following is a list of functionality that is essential to the current FAA procedures and is required of the new software:

1. Ability to create job scripts or job parameter properties files to enable the set up, reuse, and saving of elaborate job parameters to act as a reusable, shared script for repeated processing.

2. Ability to force design file drawing levels to be turned on (to force drawings on that level to show up in the output)and also turned off (to assure that anything drawn on those levels does not show up in the output) in the resultant output PDF. This functionality should work whether the design file level in the input was set on or off at the time the PDF is created.

3. Ability to filter input files within an input folder using filename wildcards. Example: only process the files named 00443*.VLP in order to process all the charts from the airport number 00443, but none other.

4. Ability to crop and center output file according to drawing extents of chart neatline.   This process roughly defines the size of the output PDF page from the virtually infinite design file plane. The neatline is drawn exclusively on level 1 and is prescribed by a seed file from which all charts are constructed. It is generally of a consistent size in all IAP / VOLPE charts. IAP / VOLPE charts have a unique definition of cropping extents. DP and STAR files have a separate definition.

5. Ability to apply sizing to final output PDF, cropping or expanding the file to achieve an exact PDF file size to accommodate the printing process for printing paper books.

6. Ability to apply text identifiers to final output PDF. Text identifiers are to be maintained as part of a reusable parameter or property file to enforce uniformity across as many as 150 instances of the software installed across a LAN. Ideally the same parameters file would be shared across all users. The text identifiers properties files must be segregated for separate TPP volumes.

7. Ability to process one or more input files from many input folders and direct output to many output folders; also one to many and many to one folders.

8. Ability to create new jobs including a customized set of properties.

9. Ability to customize job parameters: levels on or off, cropping extents, input filename extension filters, input and output directories, applying custom text boxes, sizing of files, etc. These parameters will be reconfigured by the user to accomplish custom processing scenarios.

10. Ability to set different parameters for different groups of filtered filenames within the same job.

11. Ability to set different parameters for the reference file (levels on and off for example) than for the master file (different set of levels on and off for example) for the same output PDF.

12. Ability to run multiple jobs in batch with a single command.

13. Ability to apply sizing and text identifiers to an input PDF creating a new output PDF with the applied items.

14. Ability to save job parameters for repeated reuse in later job runs.

15. Ability to export job parameters for later import into system for use in batch processing.

16. Ability to access a single copy of a parameters or properties file from multiple desktop installations of the software to enforce uniformity of processing rules for up to 150 separate instances of the software.

17. Ability to read Associated Georeferencing Metadata parameters from an Oracle database connection through ODBC.

18. Ability to do georeferenced conversions side by side (from within the same input folder) with non-georeferenced DGN to PDF conversions. The software requires the ability to differentiate between the two.

6. DELIVERABLES

Due dates for all deliverables below are counted in calendar days after contract award. If the due date falls on a weekend or holiday, the due date is assumed to be the next business day.

6.1. Hold Kick-Off Meeting

A project kick-off meeting shall be held based on a mutually agreed upon date at the FAA's Silver Spring facility to discuss the details of the project, project plan, and items needing to be agreed upon prior to contractor commencing work on the project.

Due no later than 15 days following Contract Award.

6.2. Project Plan, Work Breakdown Structure, and Project Schedule

The contractor shall submit a draft project plan, work breakdown structure and schedule for approval to the COTR within 45 days following the date of contract award.

Due 45 days following Contract award.

6.3. Monthly Project Assessments

The contractor shall submit monthly status reports to the CO and COTR no later than 5 days after the close of each calendar month. These reports shall be submitted electronically.

Due monthly, 5 days after close of each calendar month.

6.4. Facilitate JAD Meetings

The contractor shall facilitate JAD meetings once a month starting 60 days after contract award. JAD meetings are to be no longer than 2, 8 hour days each. Two JAD meetings must be planned. Additional JADs may be planned at odd intervals. These meetings would be possible after construction begins on the software and may be scheduled on mutual agreement of the contractor and the FAA.

First JAD Due 60 days after contract award; second JAD due 90 days after contract award.

6.5. Use-Case and Supplementary Requirement Specification

As a product of the JAD meetings, the contractor first draft then further define a Use-Case model and a Supplementary Requirements Specification. As requirements become more defined, these documents must be modified and kept up-to-date.

Complete, all inclusive draft Due 120 days after Contract Award

6.6. Software Architecture Document

System design shall be depicted in an informal architectural document including a use-case view, logical view, deployment view, implementation view, and a data view. The informal architecture document shall also include all supported versions of reused software modules, supported operating systems, application server (if applicable), database engine, or any other environmental software. All these aspects must fit within the IT System Constraints listed in section 7 below. This document must be finalized and serve as a constraining artifact to system implementation.

Due 127 days after Contract Award

6.7. Critical Design Review

Meeting hosted at the FAA facility in Silver Spring, MD to present the requirements and design artifacts delivered so far and to obtain sign-off from the FAA before starting construction. Follow on discussions (if needed) will be scheduled until sign-off is accomplished.

Due 134 days after Contract Award.

6.8. Software Test Plan and Testing Report

After carrying out software testing of the working system, the contractor must present the test plan and the testing results report that details the system requirements and the process to verify that all requirements are met.

Due 270 days following Contract Award

6.9. Working Software System

A primary deliverable is a working translator of Microstation V8i design files into Georeferenced PDFs. The system development and rollout shall be done by a series of releases to be agreed upon by the FAA and contractor project managers. The contractor shall deliver the final releases of the tool or tools to meet all of the requirements defined in the Use-Case model and SRS to the FAA no later than 270 days following the date of contract award. Following delivery of each iteration of the tool(s), the FAA will conduct an operational test and evaluation, to ensure all requirements have been met.

Due 270 days following Contract Award.

6.10.　　　Mass Conversion and Quality Check Report

The initial mass conversion of all the georeferenced FAA design file repository (all Airport Diagrams and IAPs) must be completed 315 days after contract award. This date will be the beginning of the quality check of the mass converted files. A cycle of defect discovery and action taken to correct defects must be depicted in the Mass Conversion and Quality Check Report.

Due 365 days after Contract Award

6.11.　　　Software Code and Programmer Documentation

The contractor shall deliver the source code and programmer documentation for any tools that were custom built for this process. The FAA will require the software code for all non COTS software. This is due by the close of the contract, no later than 365 days following the date of contract award.

Due 365 days following Contract Award.

6.12.　　　User Manual and Training Materials

The contractor shall deliver a user manual and training materials as defined in Task 5 above at the contract close. These deliverables will be subject to government acceptance. Modifications requested after the due date shall be completed by the contractor.

Due 365 days following Contract Award.

7. SYSTEM CONSTRAINTS

The following are general system hardware and software constraints that the software must operate within. JAD sessions will give the contractor opportunity to gather more detailed specifics.

7.1. Programming Languages Constraints

The following are the approved application languages for ATO systems.
- .NET C#
- Java

The following are the approved scripting and markup languages for ATO systems.
HTML
- Ruby
- JavaScript

7.2. Platform Constraints

The following platforms are supported by ATO.
- Red hat Linux: Servers
- Microsoft Windows: Severs & Clients – The software must be compatible with PC clients running both Window XP and Windows 7
- Solaris: Servers

7.3. Application Server Constraints

The following are the approved web and application servers for ATO systems.
- Oracle Application Server
- Apache Tomcat
- Microsoft IIS

7.4. Relational Database Management Systems Constraints

The following are the approved relational database management systems for ATO systems.
- Oracle 10g
- Microsoft SQL Server 2008

7.5. Web Services Constraints

Web services must comply with W3C standards and WSDL 2.0 specifications.

Web services must comply with the following FAA standards
- FAA-STD-063 XML Namespaces
- FAA-STD-064 Web Service Registration
- FAA-STD-065 Web Service Description Documents

Web services must be written with the contract-first approach to promote stability, and refutability. It also helps to avoid pitfalls such as object/XML impedance mismatch, and unmanageable generated WSDL.

Web services must be deployed and managed by Oracle web services manager

- FAA-STD-066 Web Service Taxonomies

7.6. Aeronautical Data Transfer Format

Systems that provide or exchange aeronautical information using web services must be compliant with the Aeronautical Information Exchange Model (AIXM) and the Aeronautical Information Conceptual Model (AICM).

8. GOVERNMENT FURNISHED PROPERTY (GFP) AND SERVICES

8.1. The government will provide a COTR / Project Manager and Subject Matter Experts in support of requirements gathering, scheduling advice, and problem solving advice as needed for assistance for the contractor to complete the work defined in this PWS.

8.2. The government will provide physical facilities for the Kick-Off meeting, critical design reviews (if needed), and JADs.

8.3. The government will provide softcopy input files, database table dumps, necessary database schemas for recreating the FAA environment at the contactor's facility, d-TPP Flight software installation disks, and all documented production procedure and product specification information needed by the contractor to complete the work defined in this PWS.

8.4. The government shall provide positional quality tolerances for georeferenced quality checking of output PDF files

9. CONTRACTOR FURNISHED PROPERTY (CFP) AND SERVICES

9.1. The Contractor shall provide qualified personnel, facilities (when performance is not at a government facility), related equipment, supplies, and services necessary for the successful performance of this PWS.

9.2. The Contractor shall bear the cost of any training and certifications, if required for their personnel supporting this contract.

9.3. The Contractor shall notify the Contracting Officer (CO) and CO's Technical Representative (COTR) before the close of business, the same day, if an employee is terminated or resigns.

9.4. The Contractor shall provide scheduled deliveries of requirements to the Government based on a schedule coordinated with the FAA COTR.

9.5. The Contractor shall provide the source code for any custom application developed as part of this contract. The source code will become the exclusive property of the FAA.

10. CONTRACTOR QUALIFICATIONS

10.1. The contractor shall have demonstrated expertise in the creation or use of PDF data. Knowledge of the ISO 32000 standard especially as it pertains to the georeferencing of PDF files is required.

10.2. The contractor shall have extensive knowledge in the use of Bentley's Microstation CAD drafting tool especially in the design file format Microstation output. This knowledge must apply to version 7 (Microstation J) and to version V8i.

10.3. The contractor shall have staff qualified and capable of analysis, design, and coding of a custom software application capable of fulfilling the requirement of this contract.

10.4. The contractor shall have staff qualified and capable of requirements gathering and the chairing and facilitation of JAD requirements gathering sessions. Skill in building use-case models and supplemental requirements is required.

10.5. The contractor shall have staff qualified and capable of project management activities. Building work a breakdown structure and project schedule and reporting of project progress and efficiency metrics is required.

10.6. The contractor shall have staff capable of quality checking TPP charts after the PDF conversion. Familiarity with the FAA TPP product is required.

10.7. The contractor shall submit for FAA approval, resumes of all contractor personnel tasked with this contract. The government reserves the right to exclude contractor personnel from work under this contract that do not meet the government's qualifications.

10.8. The contractor shall have in-house qualified staff for the database management and programming of the Oracle 10g database system.

11. GENERAL

11.1. Work Location

Contractor services shall primarily be performed at the contractor's facility. The Kick-Off meeting, JAD meetings, and Critical Design Reviews (provided it is necessary to hold Critical Design Review in person; teleconference would be an option) shall be held at the FAA facility in Silver Spring, MD.

11.2. Travel

The FAA COTR may request performance from the contract personnel resulting in travel outside the metropolitan area of the Contractor's facility. All travel requests

shall be provided in writing from the COTR with authorization and reference to available travel funds for the contract line item. All travel expenses will be paid according to FAA Travel Regulations.

11.3.   System Warranty

The contractor must provide warranty services to support the new system for a period of three hundred sixty five (365) days from the completion of this contract.

11.3.1. Defects

The contractor must be responsible to correct any defects identified, which are not a result of a change in one or more requirements.

11.3.2. Source Code Updates

The contractor must provide all source code updates in conjunction with the deployment of defect corrections.

11.4.   Period of Performance

The full period of performance is 365 calendar days from the date of contract award.